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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/070,396	07/03/2002	Satyendra Kumar	KSU.P0201	2900

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EXAMINER
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PADGETT, MARIANNE L

ART UNIT	PAPER NUMBER
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1762

DATE MAILED: 08/25/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/070,396	Applicant(s) KUMAR ET AL.	
	Examiner Marianne L. Padgett	Art Unit 1762	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 07 June 2002.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) 25-29 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>6/7/02</u> . | 6) <input type="checkbox"/> Other: _____  |

1. Applicant's election with traverse of Group I, method claims 1-24 in the reply filed on 7/2/04 is acknowledged. The traversal is on the ground(s) that claim 1 was improperly interpreted and that claim 25 has been amended to positively state the occurrence of the separation due to polymerization. This is not found persuasive because while the current examiner agrees that order of listing does not supply an order of doing without temporal limitations, especially when the claims further state "inducing phase separation... simultaneously during said applying step...". However, while the product claims now positively require the liquid crystal (LC) to be a separate layer from the polymer + polarization-sensitive material, this product structure may be made by a different process of separate deposition of the two layers, since when and how separation occurs is a method limitation, that only limits the product in the structure it necessitates, since that structure may be arrived at by alternative routes, the claims are properly restrictable.

The requirement is still deemed proper and is therefore made FINAL.

2. Claims 1-24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 1, it is unclear what is the relationship between the "applying a polarized light..." of line 6, and the limitation of "the alignment of the polymer and polarization sensitive material layer" (last 2 lines), because the claim does not require the polarized light to effect anything, but p. 1 lines 6-11 of the specification indicates that the gist of the invention is combining the process of "photoalignment using polarized...light" and of anisotropic phase separation. The "applying..." step and the name of the polarization-sensitive material imply a

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relationship, and the citation from p.1 implies such an intent, but as it is never positively claimed, so it is not clear now broadly the process is actually being claimed.

Also, line 3 introduces “prepolymer” (emphasis added) and there is NO claim of any polymerization reaction ever occurring, since “phase separation” is NOT polymerization, nor is homogeneously aligning, but line 10 requires the presence of “distinct layer of polymer...”, therefore implying without a clear relationship, that at some nebulous time, the prepolymer has become a polymer.

The intent of claim 3 is unclear, as the preparing step already required the “polarization... material” and “prepolymer” to be mixed! How can light mix 2 materials that are already mixed? Also, how does “imparting alignment properties...” differ from “alignment of...liquid crystal... induced by...” already required in claim 1?

Claim 4 appears to contradict independent claim 1, by requiring the polarizing light to cause (i.e. impart) the LC alignment, instead of having it induced by the adjacent (polymer + polarization-sensitive material) layer.

In claims 5 and 6, there is no clear purpose for the UV or visible light source, because they have been given no clear relationship to the “light source” of claim 1 or 4, but are introduced as something additional, i.e. “further”. The positioning is also ambiguous, as “...opposite the side with said deposited mixture” could mean the UV or VIS source is near the side opposite from the one where the mixture was deposited, or that this light source is placed in opposition to the coated side, i.e. across from the deposition. The figures would appear to indicate the former, except as claimed that the substrate need not transmit the light. Also note

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that “near” is a relative term lacking clear metes and bounds in the claims, or lacking any clear definition in the specification or cited relevant prior art. Also see “near” in claim 22.

In claim 9 (and 10), it is unclear as written when the “initial...light” is applied to the initial mixture, i.e. before or after the coating step of claim 7.

How or if the “microstructures” of claim 11 relate to any of the alignments or layers required in the proceeding claims is not clear, since no connections have been made between these terms, and it is also unclear which “said applying step”, that of claim 10 or 1, is being referred to. However, it does appear that claim 11 requires the uncoated side of the second substrate to be placed on the coated (disposed) side of the substrate of claim 1, since only it has LC in its mixture, so the “initial mixture” would need to not be between the liquid crystal and the 2<sup>nd</sup> substrate. Figures 3 and 4, the only ones relating to 2 deposited mixtures, would appear to suggest the phrasing may not be consistent with intent. Also see claim 18 for some of the same phrasing problems.

In claim 13, how does “activated” relate to any of the effects that are occurring, i.e. alignment, separation and possibly polymerization, i.e. activated for what or how or to what effect? Are they simply made more energetic by absorbing light energy? This step is not clearly related to the previous limitation, nor are the alternatives of UV or visible light positively related to any claimed light source, so it is further unclear when they are activated.

In claim 14, it is noted that “thermally activating” the mixture is clearly related to causing the claimed phase separation, but is unclear if “a thermally activated prepolymer” is intended to signify any thing in addition to this. Is it simply the means through which the claimed activated of the entire mixture occurs, or does it imply some additional intended meaning?

In claim 16, it is unclear how “epoxy and resin” relate to the 3 previously claimed components of “the mixture” in claim 1, or even if epoxy is necessarily different from the resin. Lines 4-6 of claim 16 do not make sense. How can permitting separation cause separation?

In claim 19, lines 8-9, does applicant really mean “a liquid crystal”, i.e. one single LC? If a quantity of LC material was intended, as would be logical, that is NOT what has been claimed. Also, if one of the first and second mixtures is having the LC mixed into it, what is being required to be separated when the other mixture has phase separation initiated? This does NOT make sense as written. In the Markush group’s species, “polarization” of what or “induction” of what? In the last 2 lines, are the claimed “processes” intended to directly cause alignment of the LC, and not use the separated layer as an alignment layer, as implied by the phrasing?

The phrasing “the group consisting of at least” is vague and indefinite, because it takes closed language for Markush groups and opens it up to possibly included other alternatives besides those choices listed, i.e. “at least” means that the list is the minimum choices, hence the scope is unclear. If applicants intended to require at least one selection from the group, use of standard Markush terminology is recommended, such as --selected from the group consisting of...or combinations thereof-- or --using at least one species selected from the groups consisting of ...--.

Claim 23 is dependent from independent claim 19, hence there is NO polarized to reposition as claimed, so this claim can not be properly further examined on its merit, however the proceeding claim 22 is noted to introduce the polarizer, suggesting a possible dependence problem.

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3. It is noted that the literature reference to Jain et al cited in the search report and 6/7/02 IDS, but not found in the scanned file, was said by the EPO in the PCT 409 to be anticipatory for claims 1-5, 14-15 and 25. However, as the reference is missing from the PTO scanned file, it cannot be reviewed by the examiner to (re)evaluate at this time.

In the literature reference to Kobayashi et al, parts of p.78, 79 and 81 were not legible.

It is further noted that none of the foreign patent documents cited in the IDS or the search report were found in the scanned file, nor were the literature references to Nazarenko et al, Corvazier et al or Shimada et al, thus they also have not been reviewed.

The JPO abstracts to the cited patents that were found in the file, were added to the other documents section of the IDS.

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1-3, 19, 21 and 24 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Ninomiya et al (6,083,575).

The US patent to Ninomiya et al, teaches 2 procedures, where the option of conducting the polymer phase separation and orientation simultaneously is the one relevant to the present claims. See Figures, particularly 4; col. 3, lines 66-col. 4, lines 5, 14-34 and 63-col. 5, lines 19 and 35-40; col. 6, lines 1-47, esp. 19-36; col. 7, lines 21-60; col. 8, lines 54-61; Ex. 2 and 4; and claims 11-15 and 28-30. Ninomiya et al's polymer mixture is disclosed as having a LC material, plus a polymerizable compound with a photo-dimerizable (equivalent to orientable or alignable) structure, and a polymerization initiator, where polarized light between 250-300 nm (i.e. UV) is used to cause simultaneous phase separation of an LC layer and orientation plus polymerization of the polymerization compound, which is equivalent to the claimed "prepolymer". The polymerization initiator that is sensitive to the polarized light that causes both the orientation of the photo-dimerizable structure and the phase separation, reads on the "polarization-sensitive material", as it is sensitive to a specific polarized light. The liquid crystals are oriented due to photo-dimerization of the separated polymerized layer, hence may be said to have been induced thereby. There is no discussion of the LC "homogeneously aligned" nor of placing "a second substrate over said layers" as in claim 2 or analogously in claim 21, however as illustrated, the process is shown to produce orientation all in the same direction, i.e. homogenously; and the multilayered options as in Ex. 4 involve coating successive mixture as described above, each to be treated to simultaneously cause phase separation and orientation, where all figures show substrates capping both ends of the successive coatings. Hence, after the initial coating on a



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substrate, then the rest of the coating, a substrate as illustrated, must have been placed over layer as claimed.

Alternative, it would have been obvious to one of ordinary skill in the art, given the above teachings and the implied suggestions of the illustration, to attach a substrate as claimed in order to produce a workable device, and to have applied the coatings and treatment to achieve homogeneous alignments as suggested by the drawing configuration.

6. Claims 4-5, 18 and 22-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ninomiya et al (575).

While Ninomiya et al employs polarized light, exemplified by polarized UV-light from a high pressure mercury lamp, they do not discuss how the light becomes polarized, however light from such lamps is generally not polarized unless treated, where use of a filter to do so is a conventional and standard technique, hence would have been obvious to one ordinary skill to employ in order to achieve the taught polarized light. As the multilayer structures as in Ex 4, require use of polarized first light and second light, with the latter having “vibrational direction perpendicular to the direction of the previous”, this would suggest the claimed repositioning (assuming claim 23 really should depend from 22).

7. The patent to Kumar (5,530, 566) which is prior art and to one of the present inventors, is of interest for use of phase separation techniques with a mixture of LC and prepolymer, where phase separation may be induced during polymerization, however droplets of LC, not layers of LC are being formed. Copending cases of interest, that are to overlapping inventors include US 6,610,462 B1 to Chien et al whose claims concern use of polarized UV light to provide the alignment layer, but supplies the LC material separate therefrom and;

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09/913,253 and 10/443,276 have method claims to phase separation procedures relevant to present claims, but do not necessarily relate to use of LC material therein or application of polarized light thereto.

8. Miyatake (2004/0125451 A1), Penterman et al (2002/0196390 A1) and Inou et al (5,729,319) are of interest for teaching phase-separation composite deposited layers and polarized light, but not in configurations claimed, and where the first two references are not prior art.

Schadt et al (6,160,597) is of interest for LC and polymer layers coated not injected between substrate layers, but the LC and polymer layers are separately applied.

The Japanese patent 2000-147476 to Hikiji Taketo et al (English abstract (PAJ); machine translation - claims 1 & 6-12; [0003], [0006-8], [0012-14], [0016], etc, is substantially equivalent to Ninomiya et al (575) applied above, with illustrated process directed to phase separation to form layers with polymerization using coherent light, followed by orientation (alignment) using polarized light, but with the additional option to doing both steps simultaneous. This reference is noted to have a publication data between this case's PCT and provisional filing dates.

Penterman (2003/0032713 A1), which is not prior art, illustrates and discusses composite materials that are UV treated to induce layered (stratified) phase separation with LC domains (Fig. 3-4; abstract; [0023-24], [0027], [0035-37<sup>+</sup>], Examples, esp. [0106-109,0117].

9. It is noted that claims not rejected over prior art, 6-17 and 20 potentially have allowable subject matter, when corrected for above 112 problems, depending on whether the examiner's interpretation of probable intended meaning is correct or consistent with subsequent

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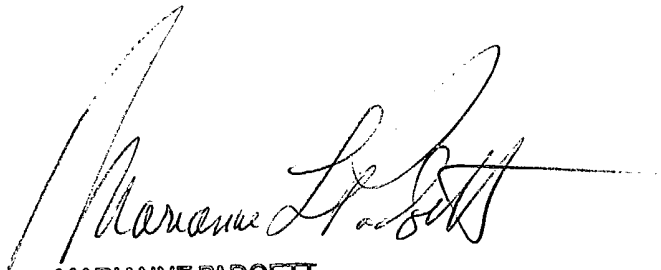
amendments and dependant on content of foreign and literature reference cited by applicant, but not available in the scanned file for the examiner to review.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to M L. Padgett whose telephone number is (571) 272-1425. The examiner can normally be reached on Monday-Friday about 8:30 am to 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck can be reached on (571) 272-1415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

M. L. Padgett/af  
August 13, 2004  
August 23, 2004



MARIANNE PADGETT  
PRIMARY EXAMINER